

Research Note

Records of the Pacific Bearded Brotula, *Brotula clarkae*, from Southern California

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The genus *Brotula* (Family: Ophidiidae) is characterized as having a circumtropical and subtropical marine distribution (Hubbs 1944; Nielsen et al. 1999). Two species are known from the Eastern Pacific: Fore-spotted Brotula (*Brotula ordwayi* Hildebrand & Barton, 1949) and Pacific Bearded Brotula (*Brotula clarkae* Hubbs, 1944). Of the two species, *Brotula clarkae* is more common and is known from higher, more subtropical latitudes in both hemispheres. Recently, *Brotula flaviviridis* was described by Greenfield (2005) from the Fiji Islands; however, this species appears to be a Fiji archipelago endemic or perhaps a species of limited distribution in the Central Pacific. Love et al. (2005) noted that the Pacific Bearded Brotula is found in the Eastern Tropical Pacific from Cabo San Lazaro, Baja California Sur to Paita, Peru, including Gulf of California, at depths of 1–645 m.

On 24 July 2001, fishes from the southern California Spot Prawn (*Pandalus platyceros*) trap fishery were collected by the California Department of Fish and Game for ongoing studies concerning related by-catch. A sample, consisting of various rockfishes (*Sebastes* spp.) and a large Spotted Cusk-eel (*Chilara taylori*), was collected from the fishing vessel *Stephanie D*. The traps for this sample were set about eight nautical miles (14.8 km) west of Point Loma, San Diego County, lat 33°09.3' N, long 117°26.7' W, in ca. 122 fathoms (223 m). The entire sample was sent to the senior author (RNL) for confirmation and documentation. Upon examination of these fishes, it was apparent that the “Spotted Cusk-eel” was not this species but was in fact a member of the genus *Brotula* and was identified specifically as *B. clarkae*. This specimen (Fig. 1) is deposited in the Department of Ichthyology at California Academy of Sciences (CAS uncatalogued) and tissue resides in the Marine Vertebrate Collection, Scripps Institution of Oceanography (SIO 02-95).

On 6 March 2003 a second specimen of *Brotula* was collected by the third author (WP), of the Los Angeles County Sanitation Districts, off the Palos Verdes Shelf, Los Angeles County, lat 33°41.8' N, long 118°20.0' W, at Station T5, from 65 m. During recovery and routine maintenance of a thermister array by the research vessel *Ocean Sentinel*, the specimen was found in the steel base of the array. The fish did not appear to be any of the expected locally caught species and was later identified as *Brotula clarkae*. This specimen is catalogued in the Marine Vertebrate Collection as SIO 07-67 (Fig. 2).

Morphometric and meristic information on these two Californian specimens are included in Table 1. Both fish are typical *Brotula clarkae* and are easily differentiated from *B. ordwayi* by pattern of coloration, counts, and morphometry (Hildebrand and

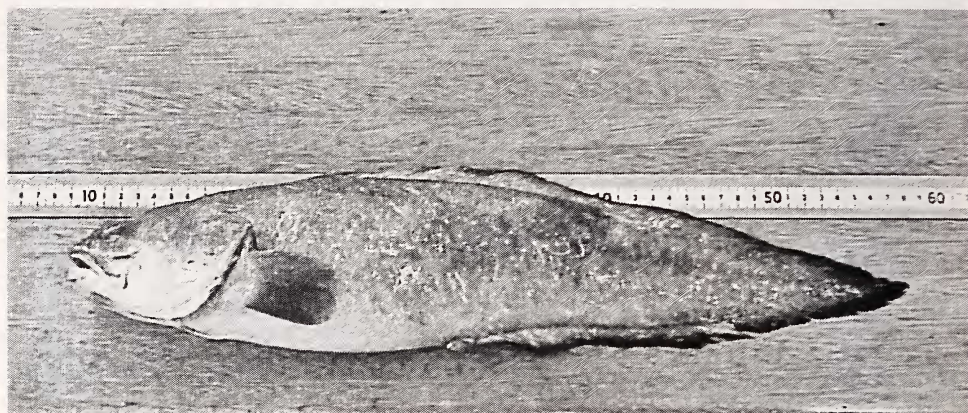


Fig. 1. Photograph of Pacific Bearded Brotula collected on 24 July 2001 off Point Loma, San Diego County by F/V Stephanie D. CAS uncatalogued.

Barton 1949; Allen and Robertson 1994). In a review of the Central Eastern Pacific (or Eastern Tropical Pacific) Ophidiidae (Lea 1995), the genus *Brotula* was considered to belong in the family Brotulidae and as a result, the two Eastern Pacific species were not included in this summary. Nielsen et al. (1999), in their treatment of ophidiiform fishes of the world, included the genus *Brotula* within the family Ophidiidae as one of 4 subfamilies (Brotulinae, Brotulotaeniinae, Ophidiinae, and Neobythitinae). Most current workers follow this system of classification (e.g. Nelson 2006). Nonetheless, the interrelationships of ophidiiform fishes, in a number of cases, are problematic.

The Pacific Bearded Brotula differs from other species of ophidiiform fishes known from California in having barbels present on the snout and chin (6 on snout and 6 on chin; characteristic of genus *Brotula*). Barbels are absent on other California ophidiiform fishes. The pelvic fins of *Brotula*, as 2 elongate rays, are inserted anteriorly on the body at about the level of the preopercle, well behind the eye. The pelvic fins, as a pair of filamentous rays, in *Chilara taylori* and *Ophidion scrippsae* (Basketweave Cusk-eel) (the two ophidiids with which it would most likely be confused), are inserted on the isthmus vertically under the eye. A list of fishes of the Order Ophidiiformes known from California waters is given in Table 2.

The oceanic climate of the eastern North Pacific was cold during the Pacific Decadal Oscillation (PDO) cold regime of the 1960s and 1970s to 1981, very warm during the 1982–84 El Niño, warm during the PDO warm regime from 1985 to the cool La Niña of 1988–89, warm during the warm regime period of 1990–98 (the warmest of the century

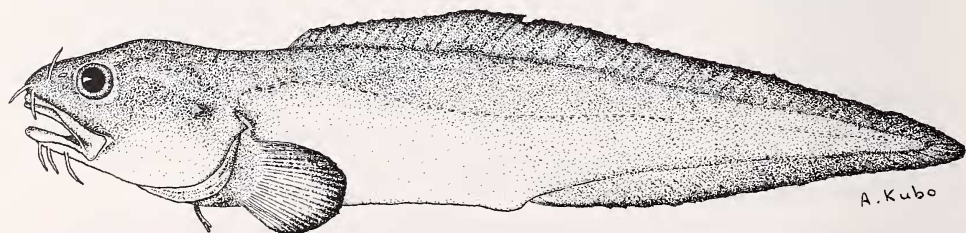


Fig. 2. Line drawing of Pacific Bearded Brotula collected on 6 March 2003 on the Palos Verdes Shelf, Los Angeles County. SIO 07-67. Drawing by Atshuhiro Kubo.

Table 1. Morphometric and meristic data for the two California *Brotula clarkae*.

Character State	CAS uncatalogued ¹		SIO 07-67	
Dorsal fin	—		ca.106	
Anal Fin	—		87	
Vertebrae	—		15 + 40 = 55	
Pectoral fin ²	ca. 27		—	
Gill Rakers	3 developed rakers on lower limb		5 + 3, 15 = 23 ³	
	mm	Percent SL	mm	Percent SL
Standard Length	465		396	
Total Length	481	—	422	—
Weight (g.)	937.8	—	—	—
Head Length	113.6	24.4	98.6	24.9
Orbit Length	18.0	3.9	15.4	3.9
Snout Length	23.6	5.1	21.5	5.4
Post-orbital Length	—	—	60.2	15.2
Interorbital Width (fleshy)	18.5	4.0	16.3	4.1
Maxilla Length	52.7	11.3	46.0	11.6
Pectoral Fin Length	49.4	10.6	43.0	10.9
Pelvic Fin Length	39.0	8.4	25.9	6.5
Body Depth (@ D origin)	—	—	80.0	20.2
Body D. (@ A origin)	86.9	18.7	72.3	18.3
Body D. (@ Nape)	—	—	64.4	16.3
Pre-dorsal Length	—	—	108.2	27.3
Pre-anal Length	233.3	50.2	210	53.0
Pre-pectoral Length	—	—	69.9	17.7
Pre-pelvic Length	—	—	103.1	26.0
Gill Raker L. (@ angle)	12.1	2.6	7.2	1.8
Lateral Line Length	—	—	370	93.4

¹ The CAS specimen was placed in temporary storage during the recent renovation of the Academy and the move of the ichthyological collection to the Howard Street location. The Academy has now returned to Golden Gate Park but the specimen has not as yet been located.

² The pectoral fin is extremely fleshy in *Brotula* and a count without radiograph or staining is approximate.

³ Formulae indicates 5 rudimentary rakers on upper limb plus 3 developed rakers followed by 15 rudimentary rakers on lower limb.

Table 2. A list of fishes of the Order Ophidiiformes known from California waters.

Family Ophidiidae	
<i>Brotula clarkae</i> Hubbs, 1944	Pacific Bearded Brotula
<i>Chilara taylori</i> (Girard, 1858)	Spotted Cusk-eel
<i>Dicrolene filamentosa</i> Garman, 1899	Threadfin Cusk-eel
<i>Lamprogrammus niger</i> Alcock, 1891	Paperbone Cusk-eel
<i>Ophidion scrippsae</i> (Hubbs, 1916)	Basketweave Cusk-eel
<i>Spectrunculus grandis</i> (Günther, 1877)	Giant Cusk-eel
Family Bythitidae	
<i>Brosphycis marginata</i> (Ayres, 1854)	Red Brotula
<i>Cataetyx rubrirostris</i> Gilbert, 1890	Rubynose Brotula
<i>Grammonus diagrammus</i> (Heller & Snodgrass, 1903)	Purple Brotula

during the 1997–98 El Niño), and cool from 1999 at least through 2005 (Chavez et al. 2003; Goericke et al. 2005). As the Pacific Bearded Brotula has planktonic larvae (Ambrose 1996) and adults were taken in southern California in 2001 and 2003, its dispersal from Baja California Sur or mainland Mexico to southern California may have occurred through larval drift and transport during the 1997–98 El Niño or perhaps during the warm regime of the early 90s preceding this event. A number of Eastern Tropical Pacific species were reported for the first time from California following the 1997–98 El Niño (Lea and Rosenblatt 2000; Allen and Groce 2001a,b; Groce et al. 2001a,b). With the two records listed above, the geographic range of *Brotula clarkae* now extends from off Palos Verdes, California, to Paita, Peru.

Acknowledgements

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Literature Cited

- Allen, G.R. and D.R. Robertson. 1994. Fishes of the Tropical Eastern Pacific. University of Hawaii Press, Honolulu, Hawaii. 332 p.
- Allen, M.J. and A.K. Groce. 2001a. First occurrence of blackspot wrasse, *Decodon melasma* Gomon 1974 (Pisces: Labridae) in California. Bull. So. Cal. Acad. Sci., 100(3):131–136.
- and ———. 2001b. First occurrence of speckletail flounder, *Engyophrys sanctilaurentii* Jordan & Bollman 1890 (Pisces: Bothidae), in California. Bull. So. Cal. Acad. Sci., 100(3):137–143.
- Ambrose, D.A. 1996. Ophidiidae: Cusk-eels. Pp. 515–531 in (Moser, H.G. ed.). The early stages of fishes in the California Current. Calif. Coop. Oceanic Fish. Invest. Atlas No. 33.
- Chavez, F.P., J. Ryan, S.E. Lluch-Cota, and M. Niquen C. 2003. From anchovies to sardines and back: Multidecadal change in the Pacific Ocean. Science, 299:217–221.
- Goericke, R., E. Venrick, A. Mantyla, S.J. Bograd, F.B. Schwing, A. Huyer, R.L. Smith, P.A. Wheeler, R. Hooff, W.T. Peterson, F. Chavez, C. Collins, B. Marinovic, N. Lo, G. Gaxiola-Castro, R. Durazo, K.D. Hyrenbach, and W.J. Sydeman. 2005. The state of the California Current, 2004–2005: still cool? Calif. Coop. Oceanic Fish. Invest., 46:32–71.
- Groce, A.K., S.L. Lagos, and E.C. Nestler. 2001a. Addition of calico lizardfish, *Synodus lacertinus* Gilbert 1890 (Pisces: Synodontidae) to the ichthyofauna of the Southern California Bight. Bull. So. Cal. Acad. Sci., 100(3):153–155.
- , R.H. Rosenblatt, and M.J. Allen. 2001b. Addition of the blacklip dragonet, *Synchiropus atrilabiatus* (Garman 1899) (Pisces: Callionymidae) to the California ichthyofauna. Bull. So. Cal. Acad. Sci., 100(3):149–152.
- Greenfield, D.W. 2005. *Brotula flaviviridis*, a new species of *Brotula* from Fiji (Teleostei: Ophidiidae: Brotulinae). Proc. Calif. Acad. Sci., 56(8):80–85.
- Hildebrand, S.F. and O. Barton. 1949. A collection of fishes from Talara, Peru. [Fishes of Peru]. Smithsonian Misc. Coll., Vol. 3, no. 10:1–30.
- Hubbs, C.L. 1944. Species of the circumtropical fish genus *Brotula*. Copeia, 1944(3):162–178.
- Lea, R.N. 1995. Ophidiidae. Pp. 1342–1348 in (F. Krupp, W. Schneider, C. Sommer, K.E. Carpenter, and V.H. Niem, eds.). Guía FAO para la identificación de especies para los fines de la pesca. Pacífico centro-oriental. Vol. 3. Vertebrados - Parte 2. FAO, Rome. (Vol. 3: 1201–1813).
- and R.H. Rosenblatt. 2000. Observations on fishes associated with the 1997–1998 El Niño of California. Calif. Coop. Oceanic Fish. Invest. Rep., 41:117–129.
- Love, M.S., C.W. Mecklenburg, T.A. Mecklenburg, and L.K. Thorsteinson. 2005. Resource inventory of marine and estuarine fishes of the West Coast and Alaska: A checklist of North Pacific and Arctic Ocean species from Baja California to the Alaska-Yukon border. U. S. Department of Interior, U. S. Geological Survey, Biological Resources Division, Seattle, WA 98104. OCS Study MMS 2005-030 and USGS/NBII 2005-001. 276 p.

- Nelson, J.S. 2006. *Fishes of the World*. Fourth Edition. John Wiley & Sons, Inc., 601 p.
- Nielsen, J.G., D.M. Cohen, D.F. Markle, and C.R. Robins. 1999. *FAO Species Catalogue, Volume 18, Ophidiiform fishes of the world (Order Ophidiiformes)*. Food and Agriculture Organization of the United Nations, Rome. 178 p.